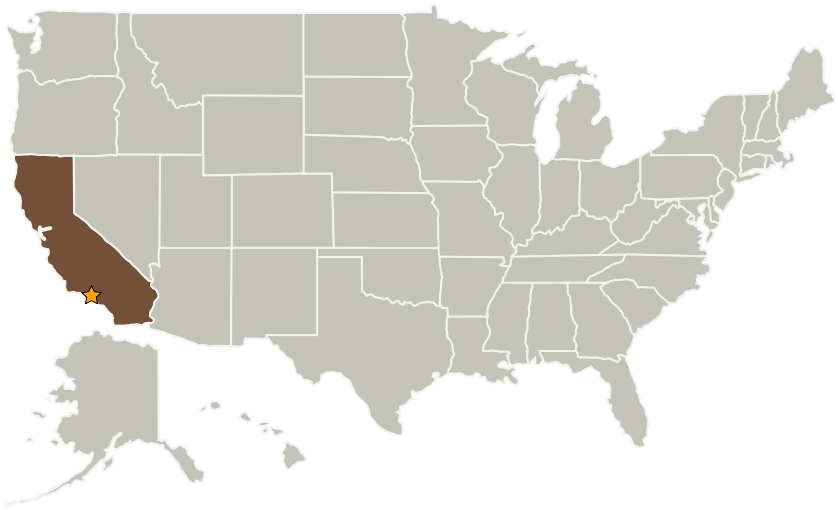
Cryogenic Vibration Damping Mechanisms for Space Telescopes and Interferometers, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

In its mission to understand how galaxies, stars, and planetary systems form, NASA's Origins Technology Program calls for advances in "enabling component and subsystem technology" for large space telescopes and other optical instruments that operate at cryogenic temperatures. In particular, the precision alignment of optical components that is required for detecting faint signatures from distant light sources presents a formidable challenge within a cryogenic environment. To meet this challenge, CSA proposes to mature magnetic eddy current vibration damping technology for use at 45 Kelvin and below. Eddy current technology is the only passive means for damping vibration in a target structure in this temperature range. Existing test data for CSA's prototype device (Figure 1) indicates that 4-8% of critical damping can be induced at temperatures as low as 17 Kelvin without adding significant weight to a target structure. The proposed Phase 1 effort would include development of analysis and test methods as well as conceptual design for a family of passive tuned mass vibration damping devices that are suitable for a host of NASA missions, including SIM, TPF, and JWST. The proposed effort offers a new approach to sub-micron level alignment and pointing control.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
CSA Engineering, Inc.	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Kirsten A Bender

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors